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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/530,475

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EXAMINER

RODGERS, COLLEEN E

ART UNIT

PAPER NUMBER

2813

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/530,475	Applicant(s) KAWARAYA ET AL.	
	Examiner Colleen E. Rodgers	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action responds to the Amendment filed 27 June 2007. By this amendment, claim 1 is amended and claim 4 is canceled.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 5-9 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042343).

Regarding claim 1, **Akui et al** disclose a process for forming a semiconductor film, comprising the steps of:

applying a semiconductor particle dispersion liquid to a substrate surface [see paragraphs 0009, 0021] by spray coating [see paragraph 0047]; and

drying the coating to form a porous semiconductor film [see paragraph 0038],

the semiconductor particle dispersion liquid being a dispersion in methanol and/or ethanol [see paragraph 0037, wherein an alcohol solvent is mentioned, and paragraph 0033, where methanol and ethanol are specified] of particles of a semiconductor, specifically a metal oxide [see paragraph 0037].

Akui et al are silent as to the mean diameter of the atomized droplets of the dispersion liquid. However, these claims are *prima facie* obvious without a showing that the claimed ranges

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achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious). In this case, there exists no evidence of record that the droplet size provides unexpected results in the layer of semiconductor particle dispersion liquid produced. One of ordinary skill in the art would be motivated to optimize the drop size to provide for processing limitations, such as the equipment used and the physical properties of the dispersion liquid (i.e. particle size, liquid viscosity, etc.).

Regarding claim 5, **Akui et al** disclose the process according to claim 4, wherein the semiconductor particles are titanium oxide particles [see paragraph 0037].

Regarding claim 6, **Akui et al** disclose the process according to claim 5, wherein the titanium oxide particles are anatase-type titanium oxide particles [see paragraph 0037].

Regarding claims 7-9, **Akui et al** disclose the process according to claim 1. **Akui et al** are silent as to the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid and the mean diameter of the atomized droplets. However, these claims are *prima facie* obvious without a showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re*

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Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious).

In this case, there exists no evidence of record that the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid or the mean diameter of the atomized droplets provide unexpected results in the layer of semiconductor particle dispersion liquid produced. One of ordinary skill in the art would be motivated to optimize the solids content of the semiconductor particle dispersion liquid, the viscosity of the dispersion liquid and the mean diameter of the atomized droplets to provide for processing limitations and the desired semiconductor film.

Regarding claims 12-14, **Akui et al** disclose the process according to claim 1. The photocatalyst formed thereby is a product of the process, and is therefore considered to be anticipated by the cited art. See MPEP 2112.02.

4. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042343) as applied to claims 1, 5-9 and 12-14 above, and further in view of **Arakawa et al** (USPN 6,228,796). **Akui et al** teach the process according to claim 1 as described above. **Akui et al** do not disclose wherein the substrate is a thermoplastic resin substrate. **Arakawa et al** disclose a substrate formed of a thermoplastic resin, specifically a high polymer film [see col. 3, line 6-65]. It would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the polymer substrate of **Arakawa et al** into the method taught by **Akui et al** because **Arakawa et al** teach that thermoplastic resin is a preferred material not only due to its high performance as in insulator, withstanding temperatures up to 400°C, but also because it is lightweight and easy to shape [see col. 3, lines 8-15].

5. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akui et al** (US Patent Application Publication 2002/0042343) as applied to claims 1, 5-9 and 12-14 above, and further in view of **Kawazu et al** (US Patent Application Publication 2002/0186469). **Akui et al** further disclose wherein the coating is dried by heating at a temperature of about 200°C or lower [see paragraph 0038]. **Akui et al** fail to disclose wherein the coating is dried by irradiation electromagnetic waves, specifically microwave irradiation. **Kawazu et al** disclose drying a coating with irradiation with electromagnetic waves [see paragraph 0014]. It would have been obvious to one of ordinary skill in the art at the time of invention to use the drying method of **Kawazu et al** in the process of **Akui et al** because the method beneficially promotes polarization in the film by completely depositing particles [see paragraph 0019].

6. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Muramatsu et al** (US Patent Application Publication 2002/0002112) in view of **Akui et al** (US Patent Application Publication 2002/0042342).

Regarding claim 15, **Muramatsu et al** disclose a photoelectrode comprising a porous semiconductor film [see paragraph 0008] on an electrically conductive transparent layer [see paragraph 0039] formed on a glass layer [see paragraph 0085]. **Muramatsu et al** do not disclose wherein the porous semiconductor film is formed by the method of claim 1, as taught by **Akui et al** as explained above. It would have been obvious to one of ordinary skill in the art at the time of invention to form the film of **Muramatsu et al** by the method of **Akui et al** because **Akui et al** teach that their method forms a film that has good adhesion and is difficult to peel off [see **Akui et al**, paragraph 0025].

Regarding claims 16 and 17, the prior art of **Muramatsu et al** and **Akui et al** disclose the photoelectrode according to claim 15. Furthermore, **Akui et al** disclose wherein the semiconductor particles are titanium oxide particles [see paragraph 0037], specifically anatase-type titanium oxide particles [see paragraph 0037].

Response to Arguments

7. Applicant's arguments filed 27 June 2007 have been fully considered but they are not persuasive. On page 8 of the Remarks, Applicants allege that the teachings of **Akui et al** do not read on the claimed invention because the "titanium oxide sol comprises titanium oxide particles dispersed in water, and use of an alcohol in the sol is only optional." The Examiner fails to understand how the fact that **Akui et al** teaches that the use of alcohol, specifically methanol or ethanol, in the sol is optional means that use of alcohol is not taught. To the contrary, **Akui et al** do teach the use of methanol and/or ethanol as described above, even if they do not require it for the method.

Furthermore, on page 9 of the Remarks, in answer to the allegation by the Examiner that the mean droplet diameter is obvious in view of the prior art, absent evidence to the contrary, Applicants present a list of four allegedly "remarkable effects" of the instant method. The Examiner asserts that this list does not constitute evidence, but merely allegations as to the superiority of the instantly disclosed method. The Examiner would also like to note that, with respect to effect (4), i.e., "the process is capable of forming a porous semiconductor film at low temperatures not higher than 200 °C, and therefore can be carried out using a thermoplastic resin substrate such as a high polymer film," Applicants' allegation that "it is impossible to obtain a porous film at a low temperature not higher than 200 °C" [underlining in the original] is incorrect for two reasons: firstly,

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the temperature at which the porous semiconductor film has been formed is not present in claim 1; and secondly, even if it were, there is still an overlap at 200°C between the teachings of **Akui et al** and the instantly disclosed method. Claim 10, which depends from claim 1, includes a limitation specifying that “the coating is dried by heating at a temperature of about 200 °C or lower,” which limitation is broad enough to be anticipated by the teachings of **Akui et al** as described above with respect to the rejection of claim 10.

Finally, with respect to the rejections of claims 2 and 3 (**Akui et al** in view of **Arakawa et al**), claims 10 and 11 (**Akui et al** in view of **Kawazu et al**) and claims 15-17 (**Muramatsu et al** in view of **Akui et al**), Applicants merely allege that each reference that has been combined with **Akui et al** fails to remedy the alleged deficiencies of **Akui et al**. However, as shown above, **Akui et al** is not believed to be deficient. Therefore, the rejections stand.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

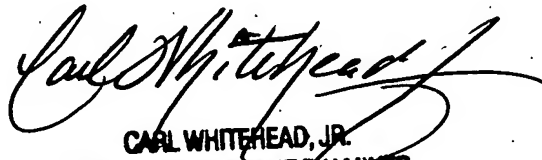
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen E. Rodgers whose telephone number is (571) 272-8603. The examiner can normally be reached on Monday through Friday, 9:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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